

# Sexual Activity as Cause for Non-Surgical Pneumoperitoneum

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## ABSTRACT

**Background:** Pneumoperitoneum is usually seen after bowel perforations and surgical procedures. An increasing number of cases of non-surgical pneumoperitoneum related to sexual activity has been reported worldwide over the last years.

**Case Example:** A typically young, otherwise healthy woman comes into the emergency department of Stanford University, California, complaining of recurrent chest pain. Free air under the diaphragm disclosed in the X-ray usually leads to intensive, costly and invasive diagnostics sometimes resulting in emergency laparotomy without any results. Finally, after thorough discussion of the sexual history of the patient is taken, vaginal insufflation during sexual activity is revealed as the cause of non-surgical pneumoperitoneum.

**Discussion:** Patients are often unaware of the open access between the vagina and abdomen. Insufflation pressure during vaginal insufflation with >100 mm Hg — used as a diagnostic tool in CO<sub>2</sub>-perturbation — can dilate genital organs and push remarkable amounts of air into the abdomen. Gas resorption can take up to several days, and the patient often does not connect the pain to its cause. Embarrassment and modesty often prevent the patient from talking about sexual activity.

**Conclusion:** Sexual pneumoperitoneum is not a bizarre sex accident but a rare and serious patho-mechanism. In cases of atypical non-surgical pneumoperitoneum in sexually active women, a careful inquiry into the medical-sexual history can reveal the cause of pathophysiology without comprehensive, painful and unnecessary diagnostics. Sexual history as a diagnostic tool should always be considered in unclear cases.

**Key Words:** Non-surgical pneumoperitoneum, Oro-vaginal insufflation, Sexual activity, Gas embolism, Pregnancy.

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## BACKGROUND

Pneumoperitoneum, often seen in acute gastrointestinal perforation, requires in about 90% of cases urgent surgical intervention. However, in 10% of cases, pneumoperitoneum has a different cause.<sup>1,2</sup> Possible gynecologic causes are knee-chest exercises, pelvic inflammatory disease, coitus, gynecologic examination procedures, vaginal douching and vaginal insufflation.<sup>1</sup> Due to a trend toward more experimental sexual activity and less taboo in media and society about this topic, an increasing number of reports of non-surgical pneumoperitoneum connected to sexual activities has been described within the last years worldwide.

We reviewed such case reports to reveal the patho-mechanism and to stress the importance of a sexual medical history to prevent unnecessary invasive diagnostics and surgery. The number of publications about this topic demonstrates the danger of (oro-) vaginal insufflation and identifies the groups at risk.

## CASE EXAMPLE

A typical case example is that of a 24-year-old woman, 0 gravid, who appeared in the emergency department complaining of severe abdominal pain of 6 hours duration. The pain was described as sharp, diffuse, initially worse in the right lower quadrant and then becoming generalized. There was no associated nausea, vomiting, chills or fever. Movement aggravated the pain with no relenting factors. The pain was continuous. Her last menstrual period was six days prior to admission with normal flow, timing and duration.

The vital signs were normal: Blood pressure 110/70, Pulse 100/min, Respiration 24/min, Temperature 36.5°C. Her abdomen had decreased bowel sounds and was diffusely tender with rebound tenderness and involuntary guarding in all quadrants. Pelvic and rectal examination, including lab, were normal.

An upright chest X-ray demonstrated free air under the diaphragm. An abdominal radiograph showed signs indicative of non-surgical pneumoperitoneum.

Her past medical history was remarkable for pneu-

moperitoneum accompanying similar episodes of pain 6 and 12 months prior to this event. The patient appeared each time with abdominal pain of acute onset and the X-ray revealed pneumoperitoneum. On both occasions, the patient underwent laparotomy; but, despite comprehensive diagnostics, no cause was found.

On further questioning, a complete sexual history was obtained. The patient revealed that she had intercourse, during which her partner forcefully blew air into her vagina prior to all episodes of pneumoperitoneum. She remembered that the pain had started four hours after each occasion.

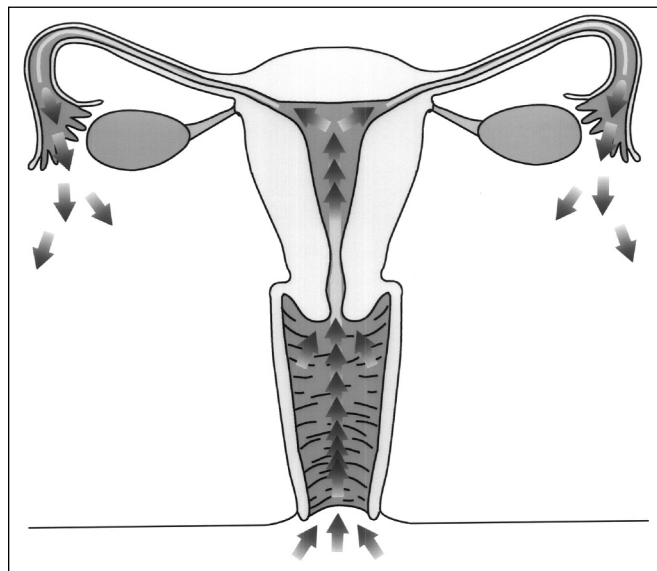
Under close conservative observation, the pain disappeared within 24 hours and repeated abdominal X-ray showed spontaneous absorption of pneumoperitoneum.

The patient was discharged with instructions to avoid further cunnilingus with oro-vaginal insufflation.<sup>3</sup>

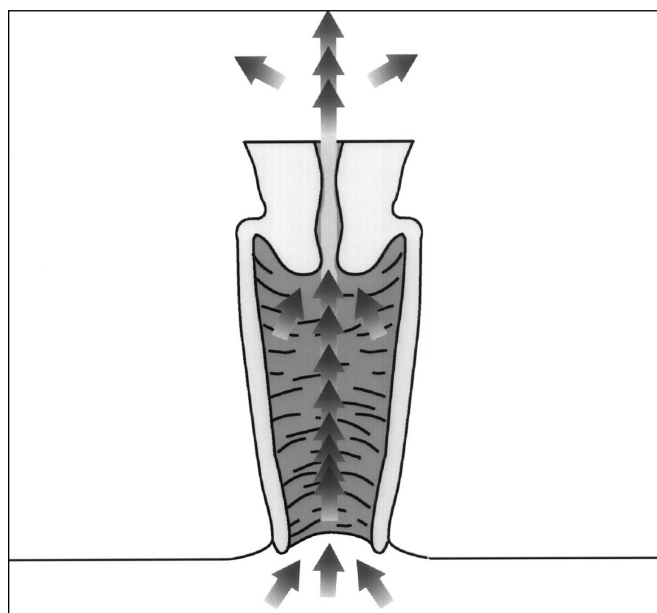
## DISCUSSION

Cunnilingus is a common sexual practice all over the world. During such activity, whereby gas can be forcefully blown into the vagina by mouth or insufflated by other mechanisms, unintended large amounts of gas can be forced under pressure into the vagina. The gas can find its way through the uterus and, after dilating the tubes, into the abdomen, thereby causing a non-surgical pneumoperitoneum. The patient often has no knowledge of the open access between the vagina and abdomen, and the medical staff is often inadequately informed on the patho-mechanism. Primarily, pneumoperitoneum — without prior surgery — is normally associated with the potential danger of perforation of intestinal organs and, therefore, often leads to emergency laparotomy.

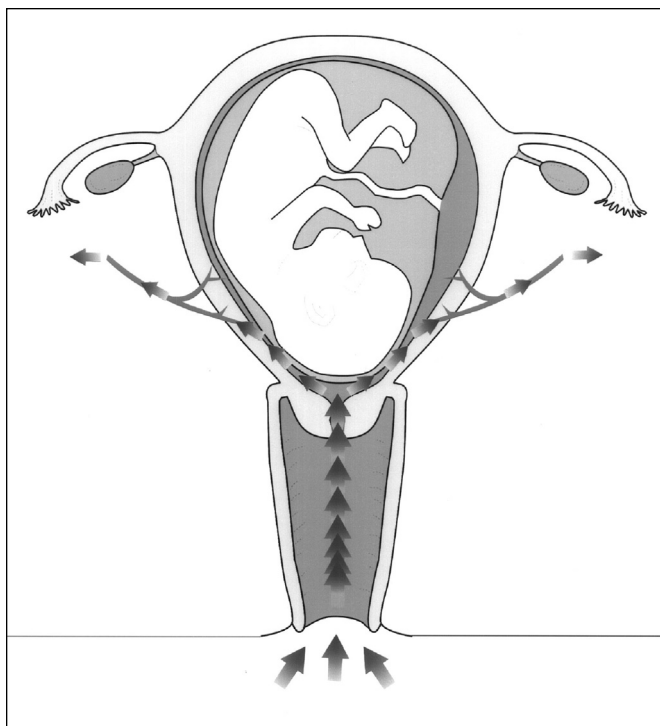
The publications reviewed show three potential gas paths: 1) Through vagina, uterus and fallopian tubes into the abdomen (**Figure 1**). Patho-mechanism is usually forceful gas insufflation, but also during sexual intercourse,<sup>4</sup> intercourse in rear entry position,<sup>5</sup> by hand or during drug abuse via oro-vaginal cocaine insufflation.<sup>6</sup> 2) Through openings at the vaginal stump after abdominal<sup>7</sup> or vaginal<sup>4,8</sup> hysterectomy<sup>7-12</sup> (**Figure 2**). Patho-mechanism is vaginal gas pressure insufflation, which can open small lacerations at the vaginal stump. 3) Through the uterine veins during pregnancy and early post partum (**Figure 3**). Patho-mechanism is gas that dilates under



**Figure 1.** Entrance path for gas along the normal anatomical way through vagina, uterus and fallopian tubes.



**Figure 2.** Entrance path for gas through small lacerations at vaginal stump after hysterectomy.



**Figure 3.** Entrance path for gas through uterine veins during pregnancy and early post partum.

pressure the uterus-placenta connection, enters the uterine veins, leading to fatal gas embolism,<sup>5-6,13-17</sup> fatal also for women early post partum.<sup>18-19</sup>

In **Figure 1** and **Figure 2**, the insufflation of gas usually leads only to painful but uncomplicated pneumoperitoneum of limited duration. However, in **Figure 3**, gas insufflation can lead to fatal gas embolism.

The potential entrance paths for gas identifies the groups at risk: 1) Forceful (oro-) vaginal insufflation in any woman; 2) Patients who have undergone a hysterectomy, independent of operation technique; and 3) Pregnant and early post partum women. (Oro-) vaginal insufflation is especially dangerous during pregnancy, because large amounts of gas can easily penetrate into the uterine veins and cause lethal gas embolism.

Intra-abdominal gas resorption from pneumoperitoneum takes up to several days, depending on content of gas. Pure CO<sub>2</sub> gas — as used in laparoscopy — is pulmonary completely eliminated within one to two hours at aver-

age resorption rates of 37 ml/min with peaks up to 223 ml/min.<sup>20</sup> However, pneumoperitoneum resorption of normal room air takes up to one week. An upright chest-abdomen X-ray usually detects pneumoperitoneum, but CT has the highest sensitivity.<sup>21</sup> A management for post-coital pneumoperitoneum and an algorithm to avoid laparotomies have been published.<sup>22,23</sup>

Because of usually unspecific and minor symptoms, the patho-mechanism of gas embolism through vaginal insufflation is rarely identified until post mortem during autopsy. After reviewing the references, this patho-mechanism must be more frequent than so far expected, probably overlooked or unrecognized due to minor or unspecific complaints that are of limited duration until gas resorption is completed. In obstetrics and gynecology, they could be hidden in the group of repeated laparoscopies for adhesiolysis or chronic, unspecific pelvic pain.

Although patients with acute non-surgical pneumoperitoneum are usually first seen by internal or surgical physicians in the emergency room, interdisciplinary consultation with other specialists such as obstetric/gynecologic, ear, nose and throat (ENT) or thoracic surgeons should be considered to eliminate other reasons of non-surgical pneumoperitoneum. Conservative treatment with close observation of vital signs and upright chest-abdomen X-ray with evidence of resorption of pneumoperitoneum is adequate. Prophylactic antibiotics are not necessary. Thorough patient education before discharge from the hospital can prevent a repeat of similar events.

In cases of non-surgical pneumoperitoneum related to sexual activities, a careful sexual medical history might reveal the cause and patho-mechanism of pneumoperitoneum and so help to avoid expensive and unnecessary emergency laparotomy. The different mechanisms of pneumoperitoneum should be explained sensitively to the patient, allowing her to understand the reason for the questioning. Nevertheless, because of the delicacy of this topic, it is advisable for legal reasons to have a colleague or nurse present during the questioning and to document this in the patient charts.

Clarification and open discussion about the risk of vaginal insufflation might prevent sexual pneumoperitoneum. Information about the open access between the vagina and abdomen should be part of sexual education at school and should be elucidated in patient information

leaflets. Facts about the patho-mechanism and potentially dangerous consequences of vaginal pressure insufflation should be made available to all sexually active women, especially to patients at risk (eg, during pregnancy, post partum and post hysterectomy). At the present time, mandatory information for all women seems neither necessary nor possible.

## CONCLUSION

Sexual pneumoperitoneum is not a bizarre sex accident but a rare and serious patho-mechanism. Vaginal gas insufflation can lead to dangerous and fatal gas embolism, especially during pregnancy. In cases of atypical non-surgical pneumoperitoneum in sexually active women, a sensitive sexual medical history can reveal the cause for non-surgical pneumoperitoneum. Comprehensive, expensive, painful, invasive and unnecessary diagnostics and procedures can be avoided. For this reason, more attention should be given to sexual history, especially as a diagnostic tool in unclear cases of pneumoperitoneum.

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